

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
5 February 2004 (05.02.2004)

PCT

(10) International Publication Number  
**WO 2004/011517 A1**

- (51) International Patent Classification<sup>7</sup>: **C08F 297/08**, C08L 23/08
- (74) Agent: **FRANK B. DEHN & CO.**; 179 Queen Victoria Street, London EC4V 4EL (GB).
- (21) International Application Number:  
PCT/GB2003/003217
- (81) Designated States (*national*): AE, AG, AL, AM, AT (utility model), AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (utility model), DE, DK (utility model), DK, DM, DZ, EC, EE (utility model), EE, ES, FI (utility model), FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK (utility model), SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (22) International Filing Date: 29 July 2003 (29.07.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
0217520.6 29 July 2002 (29.07.2002) GB
- (71) Applicant (*for all designated States except US*): **BOREALIS TECHNOLOGY OY** [FI/FI]; P.O. Box 330, FIN-06101 Porvoo (FI).
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- (71) Applicant (*for GB only*): **CAMPBELL, Neil** [GB/GB]; 179 Queen Victoria Street, London EC4V 4EL (GB).
- (72) Inventors; and
- (75) Inventors/Applicants (*for US only*): **MYHRE, Ole, Jan** [NO/NO]; Borealis AS, N-3960 Stathelle (NO). **SKAR, Merete** [NO/NO]; Lærer Johnsensvei 2, N-3960 Stathelle (NO). **DAVIKNES, Hans, Georg** [NO/NO]; Tryms vei 8, Stathelle (NO). **BROVE, Kjetil, Larsen** [NO/NO]; Kalliasen 23, Stathelle (NO). **JOHANSEN, Geir, Morten** [NO/NO]; Borealis AS, N-3960 Stathelle (NO).
- Published:**  
— with international search report
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: **SHRINK FILM**

(57) Abstract: A shrink film comprising a polyethylene film, characterized in that said polyethylene is an ethylene copolymer mixture having a molecular weight distribution in the range 10 to 35, a density of 915 to 940 kg/m<sup>3</sup>, a weight average molecular weight of at least 100000 D and an MFR<sub>2.16</sub> (190 °C) of 0.1 to 0.9 kg/m<sup>3</sup>, which copolymer mixture is produced by a two or more stage copolymerization of ethylene and 2 to 10 % mole (relative to ethylene) of a C<sub>3-12</sub> alpha-olefin comonomer in a series of reactors including at least one slurry loop reactor and at least one gas phase reactor using a heterogeneous Ziegler-Natta catalyst.

WO 2004/011517 A1

## INTERNATIONAL SEARCH REPORT

Internati Application No  
PCT/GB 03/03217

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 C08F297/08 C08L23/08

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C08F C08L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 773 257 A (UNION CARBIDE CHEM PLASTIC) 14 May 1997 (1997-05-14) cited in the application the whole document	1-20
A	WO 99 41310 A (BOREALIS POLYMERS OY ; NUMMILA PAKARINEN AULI (FI); MYHRE OLE JAN ( ) 19 August 1999 (1999-08-19) cited in the application the whole document	1-20

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*&\* document member of the same patent family

Date of the actual completion of the international search

23 September 2003

Date of mailing of the international search report

01/10/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Van Golde, L

## INTERNATIONAL SEARCH REPORT

Internet Application No

PCT/GB 03/03217

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0773257	A	14-05-1997	US 5736258 A	07-04-1998
			AT 238388 T	15-05-2003
			AU 699924 B2	17-12-1998
			AU 7065796 A	15-05-1997
			BR 9605484 A	11-08-1998
			CA 2189711 A1	08-05-1997
			CN 1195612 A	14-10-1998
			DE 69627611 D1	28-05-2003
			EP 0773257 A2	14-05-1997
			JP 3009855 B2	14-02-2000
			JP 9226006 A	02-09-1997
WO 9941310	A	19-08-1999	AU 741744 B2	06-12-2001
			AU 2425999 A	30-08-1999
			BR 9907836 A	24-10-2000
			CA 2320295 A1	19-08-1999
			CN 1296511 T	23-05-2001
			EP 1054927 A1	29-11-2000
			WO 9941310 A1	19-08-1999
			JP 2002503743 T	05-02-2002
			US 6552150 B1	22-04-2003
			ZA 9901048 A	11-08-1999